in the British Museum (Natural History): a brief description of its holdings and a history of its acquisition" by Jessie Bell MacDonald; "Biographical sketch of James Sowerby, written by his son, James de Carle Sowerby, 1825" by Diana M. Simkins; "Childhood reminiscences of James Sowerby" by Ms. Simkins; "The Sowerbys, the *Mineral Conchology*, and their fossil collection" by R. J. Cleevely; and, most importantly for malacological workers, "A provisional bibliography of natural history works by the Sowerby family" by R. J. Cleevely. The last paper not only lists all of the papers by each of the Sowerbys, but carefully analyzes the many plates in other works prepared by them as well.

While the extensive bibliography will be most useful to workers in tracking down Sowerby papers and in attributing species to the right Sowerby, a word of caution is in order, a word which ought not to be necessary for a journal of this sort. Many of the papers from the Proceedings of the Zoological Society of London are misdated, the writer not having checked his bibliography against the precise collation of that work available in PZSL itself. The latter must now be used in conjunction with the Sowerby bibliography to generate correct citations. (The PZSL collation, often useful in taxonomic work is: DUNCAN, F. MARTIN, 1937. "On the dates of publication of the Society's 'Proceedings,' 1859-1926. With an appendix containing the dates of publication of 'Proceedings,' 1830-1858, compiled by the late F. H. Waterhouse, and of the 'Transactions,' 1833-1869, by the late Henry Peavot, . . ." Proc. Zool. Soc. London (for 1937) [A] (1): 71-84 [April]).

Eugene Coan

LIGHT's MANUAL: Intertidal Invertebrates of the Central California Coast

Third Edition, edited by RALPH I. SMITH & JAMES T. CARLTON. xviii+716 pp.; 156 plts. Univ. Calif. Press, Berkeley, California 94720. $20.00. 8 May 1975

Those of us who have had the privilege of knowing the late Dr. Light are convinced that he would be deeply impressed by this third edition of what started essentially as a simple mimeographed laboratory manual for his course on marine invertebrates of the California Coast near San Francisco. That first effort was followed in 1941 by what is now referred to as "the first edition." This was still a relatively simple manual, of great usefulness to the students of the intertidal fauna, not only in the area of central California, but it was also of assistance to workers as far north as the State of Washington and as far south as San Diego. Of course, it could only lead the student in the direction toward the correct identification of his finds in those "outlying" areas.

After the untimely death of Dr. Light, the second edition, which had become necessary, was expertly "steered" to completion by Dr. Ralph I. Smith. He incorporated much new material that had come to light because of the stimulus the "first" edition had given. He also recognised that the diversity of the fauna required treatment not by a single individual and he was able to get cooperation from a number of specialists in various phyla.

Now we have the third edition. Just about 21 years have elapsed since the second edition was published. And much has happened in the world around us. We have become increasingly aware that the richness of the fauna in the intertidal area is gradually disappearing, for reasons partly known and partly unknown. We have become aware of the importance to save what it still may be possible to save and we have learned that in order to go about that task in an intelligent and efficient way we must learn more about the denizens of the intertidal area. So many "environmental impact studies" are required nowadays and they are produced – too often by so-called "environmentalists" whose qualifications are doubtful. Many reports this editor has seen were based on completely wrong identifications of animals. There will be little excuse for the same failing in the future. The Manual has been brought up to date, both as to the species reported from the area as well as to the taxonomy. This was accomplished by the conscientious updating during the years that have passed by the senior editor. But it also has been brought about through the conscientious efforts of well over 30 specialists in the various groups treated.

Not only is the material up to almost the last minute before the publication date, but it is also of almost uniform excellence. Illustrations have been well chosen and are, without exception, masterly executed. The text is clear, keys are plentiful and generally easy to use. Typography is very attractive and aids in the ease of using the book. No doubt, it is possible to find some flaws here and there in the entire work – such as some "common" species not included. This, however, cannot be a valid criticism since what may appear to one student to be a common species, may, in actuality, be a freak occurrence near the geographical border of the area covered by the work. If such criticism were acceptable, then the logical consequence would have to be that the book should include all known species of intertidal invertebrates of at least the entire west coast of North America.

We may sum up our appraisal of the book by stating that it is of the highest standard. In view of the costs of printing today, the price of the book is extremely modest, made possible, as we understand, by all contributors donating their time and labor and foregoing royalties.

We think that the editors, contributors and the artist are all to be highly commended for an extremely valuable contribution.

R. Stohler

Malacological Review

volume 7, pp. 105 to 208. edited by J. B. Burch and others. Subscription $5.00 for individuals in the U. S. A., $5.50 for private subscribers elsewhere. P. O. Box 801, Whitmore Lake, Michigan 48104. 1974.

This issue reached us just a day or two after our April issue had gone to press. We regret the delay in bringing this publication to the attention of our readers, as it continues its high standards and its all-around usefulness for malacologists. One aspect gives pause to ponder: how can this work continue to be published at this bargain price, when all publications are bedevilled by the ever increasing costs of paper, printing, and postage – what we call "the three terrible *P*s."

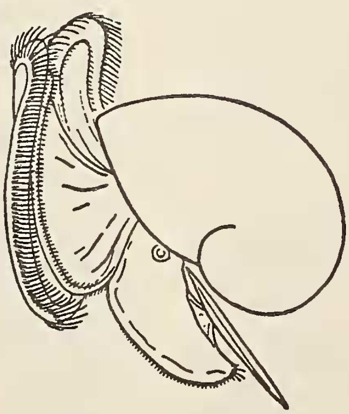
R. Stohler

Kelp Habitat Improvement Project

by Wheeler J. North. 181 pp.; 53 figures; 14 tables. Published 1974 by the W. M. Keck Laboratory of Environmental Health Engineering, California Institute of Technology, Pasadena, California 91109.

This latest report on the continuing study of the re-establishment of kelp beds off the California coast continues in the same thorough manner as the many predecessors. More optimism is engendered for the eventual complete success of the re-establishment of this important plant with its various effects on the animal life in the same general area.

R. Stohler



THE VELIGER

A Quarterly published by
CALIFORNIA MALACOZOOLOGICAL SOCIETY, INC.
Berkeley, California

VOLUME 18 — OCTOBER 1, 1975 — NUMBER 2

CONTENTS

[Continued on Inside Front Cover]

Note: The various taxa above species are indicated by the use of different type styles as shown by the following examples, and by increasing indentation.

ORDER, Suborder, **DIVISION**, Subdivision, SECTION,
SUPERFAMILY, FAMILY, Subfamily, *Genus, (Subgenus)*
New Taxa

Second Class Postage Paid at Berkeley, California

Contents — *Continued*

Distributed free to Members of the California Malacozoological Society, Inc.
Subscriptions (by Volume only) payable in advance to Calif. Malacozool. Soc., Inc.
Volume 18: $25.- Domestic; $26.50 in all Spanish Speaking Countries and Brazil;
$27.- in all Other Foreign Countries (including Canada)
Single copies this issue $18.-; postage additional.
Send subscription orders to Mrs. Jean M. Cate, P.O. Drawer 710, Rancho Santa Fe, California 92067. *Address all other correspondence to* Dr. R. Stohler, *Editor*
Department of Zoology, University of California, Berkeley, California 94720

Quaternary Larval Gastropods from Leg 15, Site 147, Deep Sea Drilling Project. Preliminary Report

BY

PETER JUNG

Naturhistorisches Museum Basel, Augustinergasse 2, CH 4051 Basel, Switzerland

(20 Plates)

INTRODUCTION

SITE 147 OF LEG 15 is situated in the Cariaco Basin off the north coast of eastern Venezuela (see RÖGL & BOLLI, 1973: fig. 1 for exact location). At Site 147 a depth of 162 m was reached and sediments of Holocene to late Pleistocene age were recovered. The biostratigraphy and the climatic interpretation based on planktonic Foraminifera were investigated by RÖGL & BOLLI (1973) and the pteropods were reported upon by the writer (JUNG, 1973). At the time when work on the pteropods was carried out, the occurrence at certain horizons of bivalves and larval gastropods was noted, but due to lack of pertinent information it was not possible to identify the material. The bivalves still remain unstudied. As to larval gastropods, it turns out that the literature on this subject is very incomplete and that the illustrations in the older literature are inadequate for the recognition of details of individual species. All the identifications in this paper had to be based on literature dealing with Recent species, because no fossil larvae have hitherto been illustrated. The use of scanning electron micrographs proves to be essential to illustrate larval gastropods. This method, however, has been applied only by a few authors in recent years, *e. g.* by ROBERTSON (1971), THIRIOT-QUIÉVREUX (1972, 1973), RICHTER (1972, 1974), THIRIOT-QUIÉVREUX & RODRIGUEZ BABIO (1975), and RODRIGUEZ BABIO & THIRIOT-QUIÉVREUX (1974, 1975). The result of this unsatisfactory situation is that this paper has to be considered as a preliminary report: although 49 different species are recognized, only a few are identified specifically. In the majority of the cases identification was possible to the familial or generic level only, and some species are illustrated and described, but remained undetermined.

Despite these circumstances it was thought worth publishing this material. As far as the writer is aware, this is the first time that fossil larval gastropod shells are illustrated. There is no doubt that future work will prove the usefulness of fossil larval gastropods for biostratigraphy, paleoecology, and studies of paleocurrents.

All the figured specimens are deposited at the Natural History Museum, Basel, under the numbers H 16805 to H 16876.

ACKNOWLEDGMENTS

The writer wishes to thank the Deep Sea Drilling Project for having made available the samples of Site 147 through H. Bolli and F. Rögl. Great help has been received from C. Thiriot-Quiévreux through discussions and literature information. Additional literature has been made available by V. Fretter, R. S. Scheltema, and G. Richter. The scanning electron micrographs were taken by R. Guggenheim and G. Haberkorn on a stereoscan Mark 2 A (Cambridge) at the geological-paleontological Institute of the University of Basel.

REMARKS ON MARINE GASTROPOD LARVAE

The facts mentioned below have been known for a long time, and the biologist is probably familiar with them. The reason for presenting the following remarks is that they may be useful to the paleontologist and perhaps a reminder for the biologist.

With regard to their early development two types of marine gastropod larvae are recognized. The lecithotrophic larvae feed on their own yolk or on nurse eggs within the egg capsule or gelatinous mass, hatch at the late veliger stage, and then settle immediately after hatching or after a short swimming-crawling period. The planktotrophic larvae feed on phytoplankton after they have hatched at the late trochophore or early veliger stage and settle after a pelagic period of varying duration (Thorson, 1950: 10; Shuto, 1974: 241).

The two types of early development are also reflected in morphological features. According to Thorson's (1950: 33) shell apex theory "the shape of the apex may inform us whether the species in question has a pelagic or a non-pelagic mode of development. ... As a general rule, a clumsy, large apex points to a non-pelagic development, while a narrowly twisted apex, often with delicate sculptures, points to a pelagic development." Thorson emphasizes, however, that "a general rule valid for all apices cannot be given."

This aspect is particularly interesting for the paleontologist, who wishes to interpret fossil assemblages ecologically and to study problems of distribution of individual species through space and time.

Shuto (1974) has given additional criteria to distinguish the two types. Referring to sculptural features, he mentioned the sinusigera riblet at the boundary between protoconch and teleoconch, a delicate reticulation, and close brephic axials, all of which are said to be exclusively (sinusigera riblet) or partly characteristic for planktotrophic larval shells.

In their recent paper on gastropod protoconchs from the Roscoff area, France, Rodriguez Babio & Thiriot-Quiévreux (1974: 545) gave an additional criterion for the recognition of species with a pelagic phase of development. They pointed out that the protoconchs of such species are differentiated in an embryonic and a larval part. The two parts are separated by a sculptural element such as an accentuated growth line, and their sculptures are usually different.

The length of the pelagic life of planktotrophic larvae is variable. The longer the pelagic life lasts, the better the chances for wide dispersal by ocean currents. On the other hand, the size of the distances over which the larvae are transported depends on the velocity of the ocean currents. It is a well established fact that trans-Atlantic transport of larvae of certain species is not only possible but may be common (Scheltema, 1966, 1971). In a study on larvae of species of the genus *Bursa*, Scheltema (1972: 865) has demonstrated that larvae of *B. thomae* are being carried across the Atlantic in both directions, *i. e.*, from east to west and from west to east. From east to west they are transported in the surface waters of the South Equatorial Current, and from west to east in the Equatorial Undercurrent at a depth of between 50 and 100m.

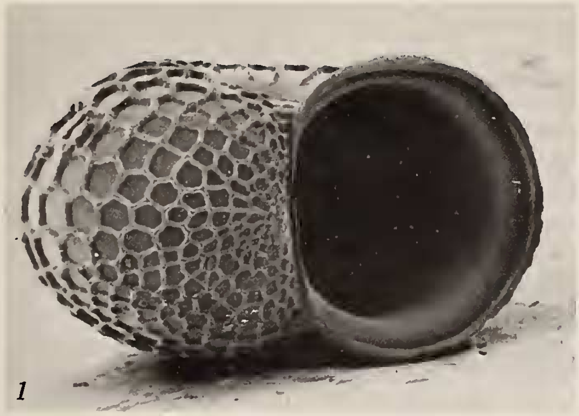
Thorson (1950: 18) has pointed out the large wastage of larvae, if they are carried away by ocean currents from coastal waters into areas where they cannot possibly survive. In order to be transported across the Atlantic, the larvae must not only have a long pelagic life, but they will have to stay in the current or they will die. Robertson (1964) has shown that larvae of the architectonicid *Philippia krebsii* may be carried from Bermuda to the Canary Islands, *i. e.*, over a distance of 4200km. But this apparently happens only occasionally: so far only 2 post-larvae of this species are known from the Canary Islands. This seems to indicate that few larvae survive the transport and settle to form a population. The tropical and semitropical *Cymatium parthenopeum* has an amphi-Atlantic distribution and its larvae must be carried regularly across the Atlantic (Scheltema, 1966). They have a broad temperature tolerance: living veligers were collected from water with a temperature as low as 13.1° C. When discussing the frequency of trans-Atlantic transport of this species, Scheltema estimated that one larva out of two million will survive the transport.

Explanation of Figures *1* to *6*

Figures *1* and *2*: *Calliostoma* sp., both from core 2, section 3, cm 50 - 52. *1*: apertural view (×190), H 16805. *2*: apical view (× 185), H 16806.
Figures *3* to *6*: Rissoid gen. et spec. indet. *3*: front view (×135), core 2, section 1, top, H 16807. *4*: enlargement of same specimen (×520). *5*: apical view (×190), core 4, core catcher, H 16808. *6*: enlargement of same specimen (×480).

Explanation of Figures *7* to *12*

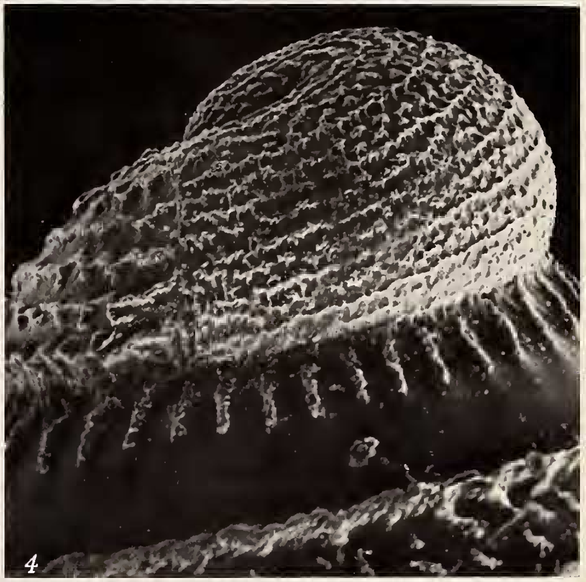
Figures *7* to *9*: Rissoid gen. et spec. indet. Views of same specimen, core 2, section 1, top, H 16809. *7*: (×480). *8*: (×960). *9*: (×145).
Figures *10* and *11*: Rissoid ? *10*: front view (×155), core 15, core catcher, H 16810. *11*: enlargement of same specimen (×480).
Figure *12*: *Cerithium* ? sp. Front view (×145), core 2, section 1, top, H 16811.



1

2

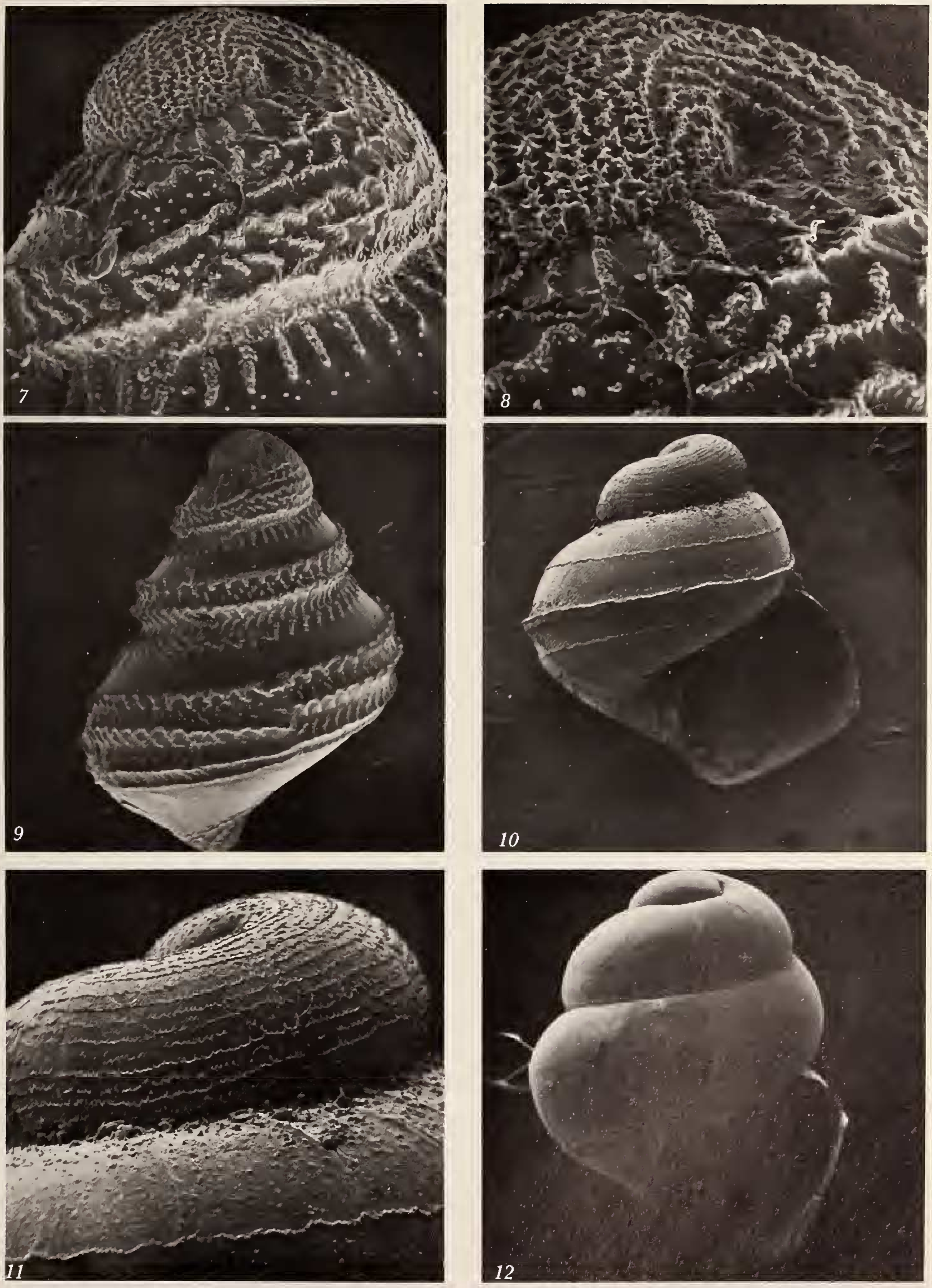
3



4

5

6


7
8
9
10
11
12

MATERIAL

For this preliminary report a total of 110 samples was available. Of these, 84 samples (= 76%) contained larval gastropods. In most of the 26 samples without larval gastropods, the bivalves were absent as well. The size of the available samples was very limited: their original volume was on the order of 10 cm³, which accounts for the generally low number of specimens.

The small amount of available specimens was one major difficulty in studying this material. But an even more serious difficulty arose from the problems of identification. The material studied contains relatively few fully grown veliger shells showing the shape of the outer lip and therefore the boundary between the protoconch and teleoconch. The majority of the shells consists of the embryonic whorl(s) and a few post-embryonic whorls. With one exception no post-protoconch (first teleoconch) whorl occurs.

In order to arrive at a reliable identification, comparison with adult specimens or with specimens with at least a few whorls of the teleoconch is indispensable. In other words, the correlation of the protoconch with the teleoconch is of primary importance. Unfortunately, adult specimens with well preserved protoconchs are rare in museum collections. The protoconch is usually broken off or – if present – eroded to a degree which will not allow for the recognition of details. If the protoconch of an adult specimen is well preserved, another difficulty arises: the aperture and the siphonal canal of the veliger shell are not visible; they are hidden by the first whorl of the teleoconch.

As far as identified, the material includes species of the following families: Trochidae, Rissoidae, Cerithiidae, Cerithiopsidae, Seguenziidae, Triphoridae, Janthinidae, Eulimidae, Ovulidae, Atlantidae, Bursidae, Columbellidae, Turridae, and Pyramidellidae. Of these the Seguenziidae, Janthinidae, and Atlantidae have a pelagic mode of life in the juvenile as well as in the adult stage. It should be borne in mind that these identifications are based exclusively on papers dealing with Recent species.

Of the 49 species recorded here, 8 belong to the pelagic families Seguenziidae, Janthinidae, and Atlantidae. If we try to apply the criteria for the recognition of species with a pelagic phase of development mentioned above to the 41 remaining forms, we obtain a list of 20 species with a pelagic phase. The type of development of the other 21 forms is either direct or not determinable due to lack of material or pertinent aspects of shells. The 20 forms with an inferred pelagic phase of development are:

Rissoid gen. et spec. indet.
Rissoid ?
Bittium sp. A
Litiopa aff. *melanostoma* Rang
Alaba incerta (d'Orbigny)
Cerithiopsis sp. A
Cerithiopsis sp. C
Cerithiopsis sp. G
Triphora sp. A
Triphora sp. B
Simnia sp.
Bursa sp. A
Bursa sp. B
Columbellid indet.
Philbertia sp.
unidentified species A
unidentified species F
unidentified species G
unidentified species H
unidentified species I

DISTRIBUTION AND ABUNDANCE

As mentioned above, not all the samples studied contained larval gastropods. The vertical distribution of the barren samples is not irregular but concentrated at certain horizons. Thus the entire cores 13 and 17 and their immediate vicinity did not yield a single larval gastropod shell. However, a reasonable explanation for their absence at these levels is not apparent for the time being.

By far the most abundant species in the section of Site 147 is *Alaba incerta* (d'Orbigny). It occurs throughout the section except at the horizons where there are no larval gastropods at all. In the upper part of the section it is represented by more specimens than in the lower part. Next in terms of abundance are *Bittium* sp. A and the unidentified species E. The latter is restricted to the upper part of the section, whereas *Bittium* sp. A is represented in the lower part as well. On the whole, the upper part of the section has yielded more specimens and species than the lower part.

Table 1 shows the vertical distribution and the abundance of 11 of the more common and easily recognizable forms. Although the samples from core catchers usually yielded the largest number and well preserved specimens, they are omitted from Table 1, because they would interrupt the continuity of information from the actual section. Information concerning occurrence and abundance of the

Table 1

Vertical distribution and abundance of some of the more common forms, and comparison of the abundance curves of the three most common species with the percentage curve of foraminiferal warm water indicators

age	depth in m	core	section	cm	*Alaba incerta*	*Litiopa* aff. *melanostoma*	*Triphora* spp.	*Bittium* sp. A	Rissoid gen. et spec. indet.	*Bursa* spec. A	*Philbertia* sp.	*Seguenzia* sp.	unidentified species A	unidentified species E	unidentified species F
Holocene	4.00	2	1	top	6			1	3						
	5.40			140 - 142	2	1			1						
	5.70		2	20 - 22	3	1	1			1	1				
	6.24			74 - 76	4	1							1		
Pleistocene	6.91			141 - 143	11			1	2	2				5	
	7.05		3	5 - 7	10		1							3	
	7.30			30 - 32	9		8							14	
	7.50			50 - 52	10		9							8	
	7.99			99 - 101	4										
	8.37			137 - 139	19			10					1	1	
	8.47			147 - 149	9		2	8						1	
	8.52		4	2 - 4	14		4	10							
	8.63			13 - 15	6		1	2							
	8.82			32 - 34	5							1		1	
	9.20			70 - 72	4		1	3							
	9.90			140 - 142	11			7					1		
	15.00	3	1	100 - 102	9										
	16.66		2	116 - 118	10									6	
	18.38		3	138 - 140	11									6	
				bottom							1				
	23.48	4	1	48 - 50	24									8	
	24.90		2	40 - 42	17									6	
	26.40		3	40 - 42	13										
	28.25		4	75 - 77	17			4						4	3
	29.19		5	19 - 21	13									18	
	30.35			135 - 136	77								1	4	
	30.75		6	25 - 27	22									5	1
	33.42	5	1	142 - 144											
	34.64		2	114 - 116	16				1	1				3	
	42.00	6	1	top	11			3							
	44.24		2	74 - 75	3										
	45.14		3	14 - 16	8			1							
	46.78		4	28 - 30	5					1			1		
	48.29		5	29 - 31											
	50.41		6	91 - 93	1			1							1
	51.99	7	1	99 - 101	7			1	1						
	52.62		2	12 - 14											
	60.00	8	1	top	3			4	1						
	61.75		2	25 - 27	1				1						
	64.27		3	127 - 129	2	1		3		2			1		
	65.40		4	90 - 92	3					1					
	67.20		5	120 - 122	17		1		1	1					
	68.69		6	119 - 121	5	1				1			1		
	70.46	9	1	146 - 148	12		1	1		1		1		1	
	71.69		2	119 - 121	1										
	73.19		3	119 - 121											
	74.00		4	50 - 52											
	75.29		5	29 - 31											
	77.02		6	52 - 54	13								1	1	
	78.14	10	1	14 - 16	14		1								
	79.76		2	26 - 28	2										
	82.21		3	121 - 123	41										

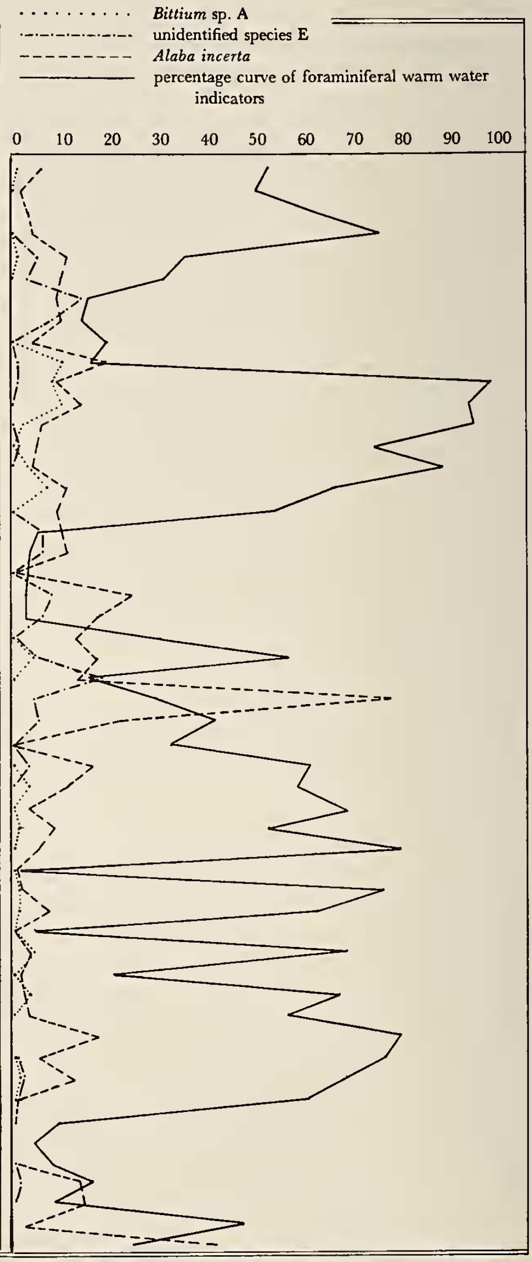
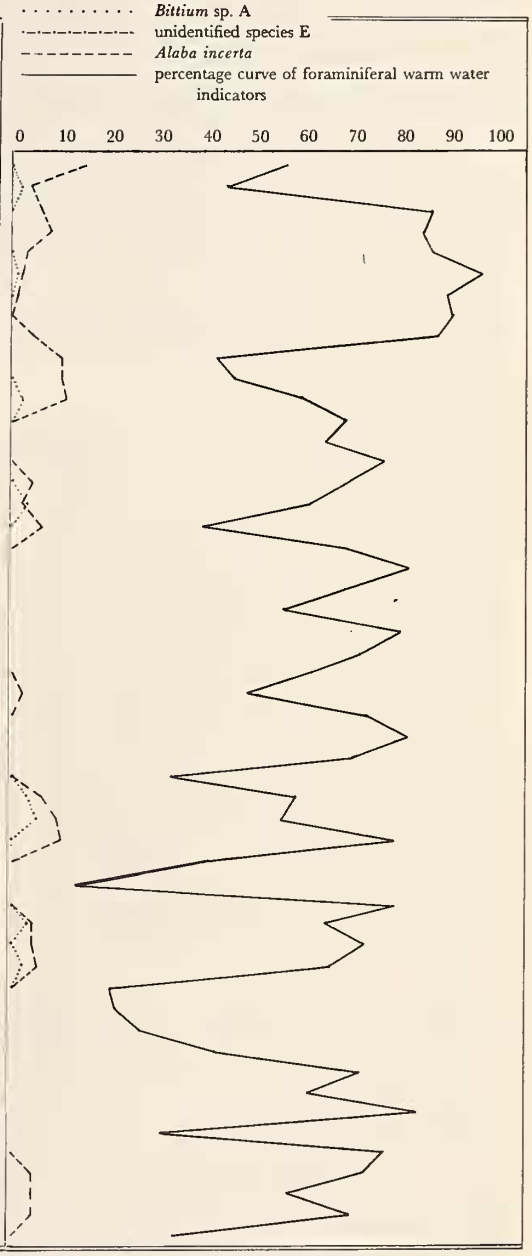


Table 1 [continued]

Vertical distribution and abundance of some of the more common forms, and comparison of the abundance curves of the three most common species with the percentage curve of foraminiferal warm water indicators

age	depth in m	core	section	cm	*Alaba incerta*	*Litiopa* aff. *melanostoma*	*Triphora* spp.	*Bittium* sp. A	Rissoid gen. et spec. indet.	*Bursa* spec. A	*Philbertia* sp.	*Seguenzia* sp.	unidentified species A	unidentified species E	unidentified species F
Pleistocene	83.46		4	96 - 98	15									1	
	84.59		5	59 - 61	4			2		2					
	88.34	11	1	34 - 36	6		1		2			3			
	90.29		2	79 - 81	8		1		2	2		2			
	92.01		3	101 - 103	3					1					
	93.60		4	110 - 112	2			1	1	2					
	94.33		5	33 - 35	1				2						
	95.10			110 - 112		1									
	96.60		6	110 - 112	4					1					
	98.02	12	1	102 - 104	10				2						
	99.61		2	111 - 113	10				3						
	100.91		3	91 - 93	11		1	2	3	1					
	101.93		4	43 - 45											
	102.65			115 - 117											
	103.20		5	20 - 22											
	103.84			84 - 86	4					1	1	2			
	104.72		6	22 - 24	2		1	3							
	105.71			121 - 123	6				2						
	106.85	13	1	85 - 87											
	108.29		2	79 - 81											
	109.61		3	61 - 63											
	111.76		4	126 - 128											
	112.74		5	74 - 76											
	114.18		6	68 - 70											
	115.75	14	1	75 - 77											
	117.37		2	87 - 89	2				1						
	119.21		3	121 - 123											
	120.84		4	134 - 136											
	121.66		5	66 - 68											
	124.18	15	1	18 - 20											
	126.20		2	70 - 72	6			3	1			1			1
	127.67		3	67 - 69	9			5	4			1			2
	129.24		4	74 - 76	10				4						2
	130.70		5	70 - 72											
	131.98		6	48 - 50											
	135.44	16	1	144 - 146											
	135.61		2	11 - 13	4			3	2	1					
	137.73		3	73 - 75	4				1						
	139.23		4	73 - 75	5			2	2						
	139.82			132 - 134											
	144.79	17	1	79 - 81											
	146.31		2	81 - 83											
	148.03		3	103 - 105											
	148.58		4	8 - 10											
	150.71		5	71 - 73											
	152.26		6	76 - 78											
	153.29	18	1	29 - 31											
	515.25		2	75 - 77											
	156.74		3	74 - 76	4	1			1						
	158.21		4	71 - 73	4				6						
	159.27		5	27 - 29	4	1	1		1						
	160.88		6	38 - 40											



species not included in Table 1 is given with the description of the larvae. Most of them occur only at one or a few horizons in very small numbers.

Table 1 also shows abundance curves of the 3 most common species, *i. e.*, *Alaba incerta*, *Bittium* sp. A, and unidentified species E for comparison with the percentage curve of foraminiferal warm water indicators of Rögl & Bolli (1973). It was hoped to obtain some sort of correlation between the two, *i. e.*, to demonstrate a certain temperature dependence of the larvae. This is not possible, however. Maxima and minima of the abundance curves of larvae do not correspond consistently to maxima or minima of the foraminiferal percentage curve of warm water indicators. The obvious conclusion from this fact is that the temperature tolerance of the 3 species mentioned above must be greater than the range of paleotemperatures as reflected by the Foraminifera.

DESCRIPTIONS

Trochidae

Calliostoma sp. (Figures *1*, *2*)

The veliger shell of this form consists of about 1¼ planispiral whorls. It is sculptured by threads forming a polygonal, often somewhat irregularly hexagonal meshwork. Near the suture the shell is unsculptured. Outer lip thickened. Aperture almost circular.

Lebour (1936: 547; plt. 1, figs. 1 - 5) described the eggs and larvae of *Calliostoma zizyphinum* (Linnaeus), which is mainly a European species. It has never been found in the western Atlantic (Clench & Turner, 1960: 15). The scanty material from site 147 is practically identical with *C. zizyphinum* according to unpublished photographs by C. Thiriot-Quiévreux. These photographs show some variability as to the thickness of the threads of the meshwork. The figures given by Lebour (*op. cit.*) suggest that she studied specimens with thick threads (hence her expression "ornamented with sunken polygonal pits"). The specimens of *C. zizyphinum* photographed by C. Thiriot-Quiévreux are virtually indistinguishable from the material of Site 147.

Occurrence:

1. Core 2, Section 3, cm 50 - 52: 1 specimen
2. Core 2, Section 4, cm 2 - 4: 1 specimen
3. Core 4, core catcher: 1 specimen

Rissoidae

Rissoid gen. et spec. indet. (Figures *3* to *9*)

Veliger shell with 3 to 3½ whorls. Embryonic part consists of a little less than one whorl and is sculptured by fine spiral threads and somewhat irregular tubercles on their interspaces. Postembryonic whorls with 2 (on body whorl 3) prominent spirals on their lower half. These spirals carry axial sculptural elements extending from them in an abapical direction for a very short distance. The space between the uppermost spiral and the upper suture is smooth except for almost orthocline, short axials adjoining the upper suture. The base is unsculptured except for a spiral near the periphery and 3 to 4 weak spirals near the umbilicus.

This species is identified as a rissoid with considerable confidence due to the sculptural pattern of the embryonic whorl which is typical for the family according to Lebour (1934a: 524), Fretter & Pilkington (1970: 8; fig. 3), and Thiriot-Quiévreux & Rodriguez Babio (1975: plt. 1, figs. B, C, E, I, L; plt. 2, figs. A - I). The many available specimens are considered to belong to one species, although the sculpture of the embryonic whorl is variable

Explanation of Figures *13* to *18*

Figures *13* to *16*: *Bittium* sp. A. *13*: front view (×190), core 2, section 4, cm 2 - 4, H 16812. *14*: enlargement of same specimen (×480). *15*: basal view (×270), core 2 section 4, cm 140 - 142. H 16813. *16*: side view (×190), core 4, section 4, cm 2 - 4, H 16814.

Figures *17* and *18*: *Bittium* sp. C. *17*: front view (×190), core 2, section 4, cm 140 - 142, H 16815. *18*: side view (×190), core 2, section 3, cm 147 - 149, H 16816.

Explanation of Figures *19* to *24*

Figure *19*: *Bittium* sp. B. Front view (×175), core 2, section 3, cm 147 - 149, H 16817.

Figures *20* and *21*: *Litiopa* aff. *melanostoma* Rang, 1829. *20*: side view (×100), core 4, core catcher, H 16818. *21*: enlargement of apex of another specimen (×480), core 15, core catcher, H 16819.

Figures *22* to *24*: *Alaba incerta* (d'Orbigny, 1842). *22*: basal view (×190), core 2, section 4, cm 2 - 4, H 16820. *23*: side view (×135), core 2, section 3, cm 137 - 139, H 16821. *24*: enlargement of same specimen as Figure *23* (×480).

13

14

15

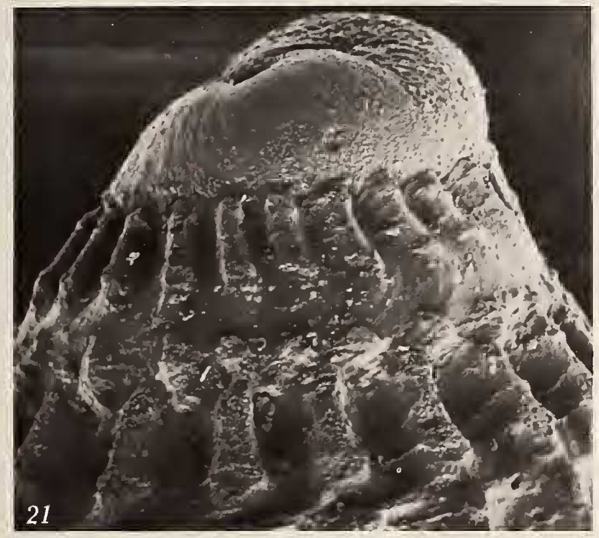
16

17

18

19

20



21

22

23

24